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Electro-Mechanical FE modeling of CORC® cable configurations based on bending experiments

Superconducting CORC® cable or wire is composed of helically wound HTS REBCO tapes in multiple layers around a round core. The cable combines isotropic flexibility and high resilience to electromagnetic and thermal loads. The flexibility of the cable is limited by the critical strain value damaging the REBCO layer in the tape. In order to optimize the manufacturing conditions and ultimately the operating performance, the mechanical behavior of CORC® cable must be comprehended for the relevant loads. A set of bending experiments is performed on simplified CORC® cable and wire configurations. Several challenges in bending experiments on simplified CORC® configurations are analyzed experimentally and these influences are accounted for proper comparison with the FEM analysis. Effects like current conduction through the copper core, transverse compressive stresses, friction between tapes and cable core and the effect of lubrication on contact resistance between tapes are studied. FEM analysis on multilayered CORC® cable and wires are carried out to check the influence of various design factors in the overall operational performance of the cable.

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